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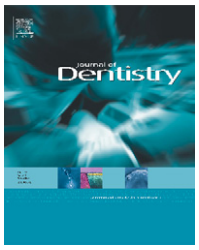

Tooth sensitivity and efficacy of in-office bleaching in restored teeth

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ABSTRACT

Objectives: The aim of this clinical trial was to evaluate efficacy (BE) and tooth sensitivity (TS) of in-office bleaching with a 35% hydrogen peroxide (HP) in patients with aesthetic restorations.

Methods: Hydrogen peroxide 35% was applied in two sessions, of three 15 min applications, in 15 patients with upper anterior sound teeth (S) and 15 with aesthetic restorations (R). The colour was recorded at baseline, one week and 6 months after treatment completion. Patients recorded TS on a 0–4 scale. The BE was evaluated by two-way ANOVA and Tukey's tests ($\alpha = 0.05$). The percentage of patients with TS was evaluated by Fisher's exact test and TS intensity of treatments was compared with Mann–Whitney *U*-test ($\alpha = 0.05$).

Results: All participants experienced TS at least once during treatment. Higher TS intensity was observed in R (1.5 [1/1.75]) compared to S (0.5 [0/1.25]) during the bleaching ($p < 0.05$). S and R demonstrated similar tooth colour enhancement compared to baseline ($p < 0.05$) and both presented colour stability after 6 months of evaluation ($p > 0.05$).

Conclusions: The in-office bleaching with 35% HP was effective in patients with aesthetic restorations, however, a higher intensity of TS was observed during the bleaching protocol.

Clinical relevance: In-office dental bleaching can be performed in patients with adhesive restorations promoting satisfactory results; however, it can promote higher intensity of sensitivity compared to patients with sound teeth.

1. Introduction

Nowadays, vital tooth bleaching is one of the most requested cosmetic dental procedures asked by patients who want an aesthetically more pleasing smile.[1] This procedure is performed by the application of carbamide or hydrogen peroxide gels on tooth surfaces and can be done at home, with or without the supervision of the dentist, or in-office by the clinician.[2,3]

At-home bleaching is the most widely taught bleaching technique in the USA[4] and the most accepted technique among patients.[5] This is probably due to the high number of successful records of satisfactory results reported with this technique.[6–10] However, there are still some people that do not want to use bleaching trays or who want faster results. In addition, some patients may not adapt well to the daily use of a bleaching tray, which increases the treatment time and costs. In these circumstances, in-office bleaching seems to be the most suitable treatment.

Although clinical studies have shown that in-office bleaching can achieve as satisfactory degree of whitening as at-home bleaching, as long as the materials are used for the

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appropriate period of time[5,11–16] most of the data we have about tooth bleaching has been gathered from participants with sound teeth, because the clinical protocol of these studies did not usually include participants with restored teeth.[12,17–22] Few studies have included participants with adhesive restorations on anterior maxillary teeth in clinical trials.[14,23,24] However, in a clinical practice, vital tooth bleaching is often performed on teeth with adhesive restorations on a daily basis, and therefore, more knowledge about the bleaching efficacy (BE) and tooth sensitivity (TS) of in-office bleaching in relation to this common condition is required.

Laboratory studies have shown that higher amounts of hydrogen or carbamide peroxide can penetrate the pulp chamber of teeth with adhesive restorations, compared to sound teeth.[25–27] Considering that TS has been reported as a common side effect, affecting more than 60% of the patients that undergo this cosmetic treatment,[17,21–23] this situation may be even worse in patients with restored teeth. To the extent of the authors' knowledge, no previous study has compared the BE, and most importantly, the TS experiences of patients with and without adhesive restorations. Therefore, the aim of this clinical trial was to compare the degree of whitening and the TS intensity of patients with and without adhesive restorations.

2. Materials and methods

This clinical investigation was approved under protocol number 12/2011 by the scientific review committee and by the committee for the protection of human beings of the local university (UEPG). Based on pre-established criteria, 30 volunteers were selected for this study. Two weeks before the bleaching procedures, all the volunteers received dental screening and prophylaxis with pumice and water in a rubber cup. They also signed an informed consent form.

2.1. Inclusion and exclusion criteria

Participants included in this clinical trial were between 18 and 35 years old. A total of 64 participants were examined in a dental chair to check if they meet the inclusion and exclusion criteria (Fig. 1). The participants were required to have central incisors of shade A2 or darker, as judged by comparison with a value-oriented shade guide (Vita Lumin, Vita Zahnfabrik, Bad Säckingen, Germany). The following were excluded from the study, since they would not be suitable for a cosmetic study such as bleaching: people who had undergone tooth-whitening procedures, smokers, pregnant/lactating women, people with severe internal tooth discoloration or endodontic treatment in anterior teeth, people taking any kind of medicine, with bruxism habits, recession, dentine exposure, or active carious lesions. Participants who reported to have spontaneous TS or sensitivity to hold and cold drinks were also excluded from the study.

2.2. Sample size calculation

With a 90% confidence interval, the number of subjects required to detect an absolute risk of TS was around 80% for both groups[12,21] with a total width of the confidence interval of 0.35, being 14 participants per group.[28] A total of 15 participants were selected for each group in order to compensate for likely dropouts.

2.3. Study groups

Participants who met the inclusion criteria were examined in a dental chair to see whether they had anterior teeth with adhesive restorations. Those participants who did not have any restoration in the facial surface of the eight upper maxillary teeth were assigned to the control group, while participants with at least one restoration in the central incisor and a maximum of four in other anterior teeth were assigned to the restored group. These restorations were not to involve more than 25% of the facial surface of the anterior teeth[14] and were to be judged as satisfactory (Alfa and Bravo for marginal adaptation and discoloration, and lack of caries lesions adjacent to the restorations) with no need of repair according to FDI criteria.[29]

2.4. Study intervention

The gingival tissue of the teeth to be bleached was isolated using a light-cured resin dam (Top Dam, FGM, Joinville, SC, Brazil). Hydrogen peroxide (HP) gel, 35% (Whiteness HP Maxx, FGM) was used in three 15-min applications for both groups according to the manufacturer's directions. The in-office bleaching agent was refreshed every 15 min during the 45-min application period. Two sessions with a one week interval were performed.

2.5. Tooth sensitivity evaluation

The participants recorded their perception of TS during the bleaching on a daily basis up to 7 days following each bleaching session. The patients were asked to report any tingling or shooting pain without provoking stimuli. A five-point verbal rating scale [0 = none, 1 = mild, 2 = moderate, 3 = considerable and 4 = severe][6,22] was employed in this study. The median score value obtained in both bleaching sessions for each time assessment was considered for statistical purposes. The values were arranged into two categories: percentage of patients that reported TS at least once during treatment (absolute risk of TS), and overall TS intensity during and up to 24 h after each bleaching session. The participants were also instructed to identify the painful teeth every time they experienced TS.

2.6. Shade evaluation

Shade evaluation was recorded using two methods: a subjective evaluation using a shade guide (Vita Lumin, Vita Zahnfabrik, Bad Säckingen, Germany) and an objective evaluation using the spectrophotometer (Easyshade, Vident, Brea, CA, USA). Colour was evaluated with teeth in a complete hydrated condition at baseline, 1 week and 6 months after the bleaching protocol. Colour was not evaluated soon after each bleaching session in order to avoid the influence of tooth dehydration and demineralization that occurs simultaneously with the whitening effect on the final colour outcome.